



Stanton-in-Peak Church of England Primary School

Science Progression and Long Term Plan

"Great are the works of the Lord, studied by all who delight in them." (Psalm 111:2)

"Life in all its fullness." John 10:10

Intent:

At Stanton C of E Primary School we recognise the importance of Science in every aspect of daily life. We aim to help our children foster a love of the sciences through hands on activities, developing curiosity about the world and discovering knowledge for themselves. We give our pupils that chance to explore the worlds around them and encourage them to raise their own questions. We encourage the children to ask questions and think critically in Science lessons and aim to encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence.

Our science curriculum provides pupils with an understanding of both **substantive** and **disciplinary** knowledge.

Substantive knowledge- is the subject knowledge and explicit vocabulary used to learn about the content

Disciplinary knowledge– this considers how scientific knowledge originates and is revised. It is through disciplinary knowledge that children gradually become more expert by thinking like a scientist.

Our bespoke curriculum is built around three areas of substantive knowledge, which are plants and animals, the world around us and materials which is interweaved with the teaching of disciplinary knowledge.

Implementation:

In EYFS, science is taught as part of the "Understanding the World" strand of learning, with a mixture of continuous provision activities and adult-led learning. From Year 1 onwards we adopt a more formal approach from in which the children engage in different types of scientific enquiries, including practical activities and begin to recognise ways in which they might answer and present scientific questions.

Our curriculum ensures that pupils learn **substantive** and **disciplinary knowledge**. Our pupils learn to; compare objects, materials and living things and pupils are taught how to sort and group them as well as observing changes over time. Pupils are encouraged to notice patterns and relationships. Staff model and teach pupils how to find out information for themselves including asking people questions and using simple secondary sources to find answers such as books and the internet. Pupils use a range of equipment to conduct their own investigations and gather data, including taking measurements. They are then taught how to record, analyse and evaluate this data. With help they are able to communicate their findings in a range of ways using scientific language.

Impact:

- All children will achieve at least age related expectations in Science at the end of their cohort year.
- Children will retain knowledge that is pertinent to Science with a real life context.
- Children will be able to use scientific vocabulary accurately.
- Children will be able to question ideas and reflect on knowledge.
- Children will work collaboratively and practically to investigate and experiment.

- Children will be able to explain the process they have taken and be able to reason scientifically.

We aim to ensure that in Science all pupils:

- Ask simple questions recognising that they can be answered in different ways
- Make observations using simple equipment
- Perform simple tests
- Identify and classify
- Use their observations and ideas to suggest answers to questions
- Gather and record data to help answer questions

Assessment

At the end of each unit of work our teachers or science coordinator completes a formal assessment with our pupils. The assessment is based on the key substantive and disciplinary knowledge that we have identified our children should know at the end of each unit. This assessment is then analysed by the subject leader alongside class teachers to establish areas of learning which have been taught and learnt well and areas in which we need to improve on our teaching and learning. This assessment forms the basis of continual changes that we make to our medium term plans. Alongside this, teachers will assess the key knowledge from the last lesson at the beginning of each lesson. Any lost learning or misconceptions will be identified immediately.

All assessment data, pupil surveys, pupil voice and staff surveys are kept with the subject coordinator. The subject coordinator also checks the medium term plans (MTPs) to match the agreed learning objectives and identified key knowledge matches the long term plans (LTP).

Early Year Framework

Understanding the World (People and Communities)

Children know about similarities and differences between themselves and others, and among families, communities and traditions.

Understanding the World (The World)

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.



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Long Term Plan (2 year rolling cycle)

"Life in all its fullness." John 10:10

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Cycle 1	I	Animals, including humans -		Materials	materials	Plants	Animals inc Humans
	J1	States of Matter	Plants	Animals including humans-nutrition & food chains		Rocks	Light
	J2	Light	Working Scientifically	Earth and Space	Electricity	Living things and their Habitats	

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Cycle 2	I	Uses of everyday materials		Animals, including humans (classification/habitat)		Plants	Animals inc Humans
	J1	Living things and their habitats	Animals including humans-skeltons and digestions	Forces ad magnets		Sound	Electricity
	J2	Forces	Properties and Changes of Material	Living things and their Habitats	Animals Including Humans	Evolution and Inheritance (Sum 1)	



Stanton-in-Peak Church of England Primary School

Progression in Substantive Knowledge

"Life in all its fullness." John 10:10

SUBSTANTIVE KNOWLEDGE

EYFS	Year 1/2	Year 3/4	Year 5/6
They make observations of animals and plants and explain why some things occur, and talk about changes. Key Knowledge in EYFS: - Plant seeds and care for growing plants. - Understand the key features of the life cycle of a plant and an animal- frog, chick or butterfly. - Explore the natural world around them, making observations and drawing pictures of animals and plants Vocabulary:	Plants - identify and name a variety of common wild and garden plants, including deciduous and evergreen trees (Cycle 1) - identify and describe the basic structure of a variety of common flowering plants, including trees: petals, leaves, flowers, fruit, buds, roots, seed, trunk, branches, stems (Cycle 1) - Pupils keep records of how plants may change overtime i.e. in the different seasons i.e. leaves falling or trees, buds opening (Cycle 1) - observe and describe how seeds and bulbs grow into mature plants (Cycle 2) - find out and describe how plants need water, light and a suitable temperature to grow and stay healthy (Cycle 2) - Science Enrichment- Each year pupils plant and observe plants and vegetables that they have planted growing over time. Vocabulary: Names of common plants: wild plant, garden plant, evergreen tree, deciduous tree, common flowering plant, weed, grass. Name some features of plants: e.g. flower, vegetable, fruit, berry, leaf/leaves, blossom, petal, stem, trunk, branch, root, seed, bulb, soil.	Plants - identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers - explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant - investigate the way in which water is transported within plants - explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal Vocabulary: Water transportation: transport, evaporation, evaporate, nutrients, absorb, anchor. Life cycle of flowering plants: pollination (insect/wind), pollen, nectar, pollinator, seed formation, seed dispersal (animal/wind/water), reproduce, fertilisation, fertilise, stamen, anther, filament, carpel (pistil), stigma, style, ovary, ovule, sepal, carbon dioxide. Assessment: Match the parts roots, stem, petals, seed. To their function Explain how water travels within plants Explain the life cycle of flowers	

water, seed, petal, root, stem, soil, pot, plan, animal, adult, babies, born.	Name some common types of plant e.g. sunflower, daffodil. Growth of plants: germination, shoot, seed dispersal, grow, food store, life cycle, die, wilt, seedling, sapling. Needs of plants: sunlight, nutrition, light, healthy, space, air. Name different types of plant: e.g. bean plant, cactus. Names of different habitats: e.g. rainforest, desert. <u>Assessment (Cycle 1):</u> Label a plant with the following parts roots, stem, petals, seed. To name the plants daffodil, daisy, sunflower. Explain the difference between an evergreen and a deciduous tree. I can explain how plants change in the different seasons <u>Assessment (Cycle 2):</u> Describe how seeds/bulbs grow into plants. Say the three elements plants need for survival.		
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Biology: Animals, including humans			
SUBSTANTIVE KNOWLEDGE			
EYFS	Year 1/2	Year 3/4	Year 5/6
Children know about similarities and differences in relation to living things. They make observations of animals and plants and explain why some things occur, and talk about changes. Key Knowledge in EYFS: - Use all their senses in hands-on exploration of natural materials. - Understand the key features of the life cycle of a plant and an animal- frog, chick or butterfly. - Explore the natural world around them, making observations and drawing pictures of animals and plants	<u>Animals, including humans</u> - notice that animals, including humans, have offspring which grow into adults (Cycle 1) - find out about and describe the basic needs of animals, including humans, for survival (water, food and air) (Cycle 1) - describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene (Cycle 1) - identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense (Cycle 1) - identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals (Cycle 2) - identify and name a variety of common animals that are carnivores, herbivores and omnivores (Cycle 2) - describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets (Cycle 2) <u>Vocabulary:</u>	<u>Animals, including humans</u> - identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat - identify that humans and some other animals have skeletons and muscles for support, protection and movement - construct and interpret a variety of food chains, identifying producers, predators and prey - describe the simple functions of the basic parts of the digestive system in humans - identify the different types of teeth in humans and their simple functions <u>Vocabulary:</u> Food groups and nutrients: fibre, fats (saturated and unsaturated), vitamins, minerals. Skeletons and muscles: skeleton, muscles, tendons, joints, protection, support, organs, voluntary muscles, involuntary muscles, biceps, triceps, contract, relax, bone, cartilage, shell, vertebrate, invertebrate, endoskeleton, exoskeleton, hydrostatic skeleton.	<u>Animals, including humans</u> - describe the changes as humans develop to old age Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows. - identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood - recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function - describe the ways in which nutrients and water are transported within animals, including humans <u>Vocabulary:</u> Process of reproduction: gestation, asexual reproduction, sexual reproduction, sperm, egg, cells, clone. Changes and life cycle: embryo, foetus, uterus, prenatal, adolescence, puberty, menstruation, adulthood, menopause, life expectancy, old age, hormones, sweat. Changing body parts: e.g. breasts, penis, ovaries, genitalia, pubic hair. Circulatory system: circulation, heart, pulse, heartbeat, heart rate, lungs, breathing, blood vessels, blood, pump, transported, oxygenated blood, deoxygenated blood, oxygen, arteries, veins, capillaries, chambers, plasma, platelets, white blood cells, red blood cells. Lifestyle: drug, alcohol, smoking, disease, calorie, energy input, energy output. Other: water transportation, nutrient transportation,

Vocabulary: Names of animal groups: fish, amphibians, reptiles, birds, mammals. Animal diets: carnivore, herbivore, omnivore. Human and animal body parts: e.g. body, head, neck, arms, elbows, legs, knees, face, ears, eyes, nose, hair, mouth, teeth, hands, feet, tail, wings, feathers, fur, beak, fins, gills. Human senses: sight, hearing, touch, smell, taste. Exploring senses: loud, quiet, soft, rough. Other: human, animal, pe	Names of animal groups: fish, amphibians, reptiles, birds, mammals. Animal diets: carnivore, herbivore, omnivore. Human and animal body parts: e.g. body, head, neck, arms, elbows, legs, knees, face, ears, eyes, nose, hair, mouth, teeth, hands, feet, tail, wings, feathers, fur, beak, fins, gills. Human senses: sight, hearing, touch, smell, taste. Exploring senses: loud, quiet, soft, rough. Other: human, animal, pet. Being born and growing: Young, offspring, live young, grow, develop, change, hatch, lay, fly, crawl, talk. Young and adult names: e.g. lamb and sheep, kitten and cat, duckling and duck. Life cycle stages: e.g. baby, toddler, child, teenager, adult; frogspawn, tadpole, froglet, frog. Survival and staying healthy: basic needs, survive, food, air, exercise, diet, nutrition, healthy, balanced diet, hygiene, germs. Food groups: fruit and vegetables, proteins, dairy and alternatives, carbohydrates, oil and spreads, fat, salt, sugar. <u>Assessment Cycle 1:</u> I understand the vocabulary of lifecycles (offspring, live young, adult, life cycle) Name the three basic things (water, food, air) that animals need to survive. Name some foods you should eat more or less of Say ways to keep healthy (wash hands, brush teeth, exercise, eat well). <u>Assessment Cycle 2:</u> I can name a variety of different types of animals. I understand what carnivores, herbivores and omnivores are and can name some animals in each category Label the human body	Names of human bones: e.g. skull, spine, backbone, vertebral column, ribcage, pelvis, clavicle, scapula, humerus, ulna, pelvis, radius, femur, tibia, fibula. Digestive system: digest, digestion, tongue, teeth, saliva, salivary glands, oesophagus, stomach, liver, pancreas, gall bladder, small intestine, duodenum, large intestine, rectum, anus, faeces, organ. Types of teeth and dental care: molar, premolar, incisor, canine, wisdom teeth, tooth decay, plaque, enamel, baby (milk) teeth. Food chains and animal diets: decomposer, food web. <u>Assessment:</u> Name the different types of food Explain where we get food from Explain the use of bones and muscles Label parts of the digestive system Explain what parts of the digestive system do Label the types of teeth and say what they are used for	waste products. <u>Assessment:</u> Name the stages of human development Explain why changes happen during puberty Explain the function of the heart Label a diagram of the heart Describe the content of the blood Describe how nutrients and water are transported around the body <u>Evolution and inheritance</u> - recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago - recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents - identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution <u>Vocabulary:</u> Evolution and inheritance: evolve, adaptation, inherit, natural selection, adaptive traits, inherited traits, mutations, theory of evolution, ancestors, biological parent, chromosomes, genes, Charles Darwin. Other: selective breeding, artificial selection, breed, cross breeding, genetically modified food, cloning, DNA. <u>Assessment:</u> Explain what evolution means Explain how fossils are made and how they provide information Explain what inheritance means Explain how offspring can vary from its parents Explain how animals can adapt to their environment and lead to evolution
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Biology: Living things and their habitats

SUBSTANTIVE KNOWLEDGE

EYFS	Year 1/2	Year 3/4	Year 5/6
Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes. Key Knowledge in EYFS: - Learn how to care for animals and what basic things they need for life- food, water, oxygen. - Look at a simple food chain. - Learn simple plant and tree names- dandelion, daisy, daffodil, oak tree, silver birch (trees at Forest School). Enrichment: Pupils learn in Forest School/Green Zone about microhabitats i.e. woodlice live under bark/stones. They observe how living things depend on each other i.e. plants being both shelter	<u>Living things and their habitats</u> - explore and compare the differences between things that are living, dead, and things that have never been alive (Cycle 1) - identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other (Cycle 1) - identify and name a variety of plants and animals in their habitats, including microhabitats (Cycle 1) - describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food (Cycle 2) - Through our range of topics children learn to identify and compare plants and animals found in different habitats i.e. rainforests, woodland, polar regions, oceans. (Cycle 2) - Pupils learn how to construct simple food charts in a variety of different habitats i.e. woodland, rainforest, polar regions. (Cycle 2) Enrichment:	<u>Living things and their habitats</u> - recognise that living things can be grouped in a variety of ways - explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment - understand the difference between a vertebrate and an invertebrate - recognise that environments can change and that this can sometimes pose dangers to living things i.e. pollution & human development. Vocabulary: Living things: organisms, specimen, species. Grouping living things: classification, classification keys, classify, characteristics. Names of invertebrate animals: snails and slugs, worms, spiders, insects. Invertebrate body parts: e.g. wing case, abdomen, thorax, antenna, segments, mandible, proboscis, prolegs. Environmental changes: environment,	<u>Living things and their habitats</u> - describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird - describe the life process of reproduction in some plants and animals - describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals - give reasons for classifying plants and animals based on specific characteristics Vocabulary: Reproduction: asexual reproduction, sexual reproduction, gestation, metamorphosis, gametes, tuber, runners/side branches, plantlet, cuttings, embryo, adolescent, penis, vagina, egg, pregnancy, gestation. Classifying: Carl Linnaeus, Linnaean system, flowering and non-flowering plants, variation. Microorganisms: bacteria, single-celled, microbes, microscopic, virus,

and food for animals. Pupils also learn in forest School/green Zone whether things are living, dead or were never alive. Vocabulary: dandelion, daisy, daffodil, oak tree, silver birch, food chain, habitat, woodland	Pupils learn in Forest School/Green Zone about microhabitats i.e. woodlice live under bark/stones. They observe how living things depend on each other i.e. plants being both shelter and food for animals. Pupils also learn in forest School/green Zone whether things are living, dead or were never alive. Vocabulary: Living or dead: living, dead, never living, not living, alive, never been alive, healthy. Habitats including microhabitats: depend, shelter, safety, survive, suited, space, minibeast, air. Life processes: movement, sensitivity, growth, reproduction, nutrition, excretion, respiration. Food chains: food sources, food, producer, consumer, predator, prey. Names of habitats and microhabitats: e.g. under leaves, woodland, rainforest, sea shore, ocean, urban, local habitat. Assessment (Cycle 1): Be able to say which objects are alive, dead and things that have never been alive Match animals to their habitats Assessment (Cycle 2): Label a simple food chain	environmental dangers, adapt, natural changes, climate change, deforestation, pollution, urbanisation, invasive species, endangered species, extinct. Assessment: Understand what each letter in MRSGREN stands for Match some animals to their classification Understand the difference between a vertebrate and an invertebrate Be able to use a classification key Describe how humans can affect habitats including the sea.	fungi, fungus, mould, antibiotic, yeast, ferment, microscope, decompose. Assessment: Complete the lifecycle of an animal diagram Explain how animals reproduce- match words to phrases Complete a classification grid Give reasons on how to classify a groups of animals into two groups
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Chemistry:			
SUBSTANTIVE KNOWLEDGE			
EYFS	Year 1/2	Year 3/4	Year 5/6
Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment. Key Knowledge in EYFS: - Identify different materials – cardboard, glass, metal, plastic. - Experiment with changing the shape of objects by squashing, bending, twisting and stretching. - That some materials can float and some can sink Vocabulary: plastic, glass, metal, cardboard, material,	CHEMISTRY <u>Uses of everyday materials</u> - identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (Cycle 1) - find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Cycle 1) - distinguish between an object and the material from which it is made (Cycle 1) - identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock (Cycle 2) - describe the simple physical properties of a variety of everyday materials (waterproof, flexible, absorbent, hard, soft) (Cycle 2) - compare and group together a variety of everyday materials on the basis of their simple physical properties (Cycle 2) Vocabulary: plastic, glass, metal, water, rock, paper, cardboard, rubber, fabric. Properties of materials: hard, soft, shiny, dull, stretchy, rough, smooth, bendy, not bendy, transparent, opaque, waterproof, not	CHEMISTRY <u>States of matter</u> - compare and group materials together, according to whether they are solids, liquids or gases - observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) - identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature Vocabulary: States of matter: solids, liquids, gases, particles. State change: evaporate, condense, melt, freeze, heat, cool, melting point, freezing point, boiling point, water vapour. Water cycle: precipitation, evaporation, condensation, ground run-off, collection, underground water, bodies of water (sea, river, stream), water droplets, hail. Other: atmosphere. Assessment: Identify states of different materials Name the different states of matter Explain what happens to materials when they change state Describe the water cycle and explain evaporation and condensation	CHEMISTRY <u>Properties and changes of materials</u> - compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets - know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution - use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating - demonstrate that dissolving, mixing and changes of state are reversible changes - explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda - give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic Vocabulary: Properties of materials: thermal conductor/insulator, magnetism, electrical resistance, transparency. Mixtures and solutions: dissolving, substance, soluble, insoluble.

object, squashing, bending, twisting, stretching, float, sink.	waterproof, absorbent, not absorbent, sharp, stiff. Changing shape: squash, bend, twist, stretch. Properties of materials: e.g. strong, flexible, light, hard-wearing, elastic. Other: suitability, recycle, pollution <u>Assessment:</u> Match items to the materials they are made from and label the materials Match items with properties (waterproof, flexible, absorbent, hard, soft) Match objects that are created naturally or by man Say why some materials are suitable for certain products i.e. plastic for a water bottle.	<u>Rocks</u> -compare and group together different kinds of rocks (sedimentary rock, igneous rock, metamorphic rock) on the basis of their appearance and simple physical properties (permeable, semi-permeable, impermeable, durable). -describe in simple terms how fossils are formed when things that have lived are trapped within rock - recognise that soils are made from rocks and organic matter. <u>Vocabulary:</u> Types of rock: sedimentary rock, igneous rock, metamorphic rock. Properties of rocks: permeable, semi-permeable, impermeable, durable. Names of rocks: e.g. marble, chalk, granite, sandstone, slate. Formation of rocks and fossils: natural, human-made, magma, lava, molten rock, sediment, erosion, fossilisation, layers, bone, fossil. Soil: sandy, chalky, clay, peaty, loamy, topsoil, subsoil, bedrock, mineral, organic matter, compost. Other: palaeontology. <u>Assessment:</u> Identify and group different types of rock (sedimentary, igneous and metamorphic) Describe how rocks are made and what they are made from.	Changes of materials: reversible change, physical change, irreversible change, chemical change, burning, new material, product. Separating: sieving, filtering, magnetic attraction. <u>Assessment:</u> Identify and group materials based on the properties mentioned above. Label a diagram with the words dissolving, solution and describe how to recover a solution. Choose substances that can be separated by filtering, sieving and evaporating Understand what is meant by a reversible change Explain why some change is not reversible (formation of new materials)
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Physics			
SUBSTANTIVE KNOWLEDGE			
EYFS	Year 1/2	Year 3/4	Year 5/6
Children talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes. <u>Key Knowledge in EYFS:</u> - Name the 4 seasons and discuss what happens at each stage. - Learn the names of the months. - Begin to associate seasons with Christmas and Easter) - Discuss the weather - Use a thermometer as a class <u>Vocabulary:</u> Seasons: spring, summer, autumn, winter, Weather: e.g. sun, rain, snow, sleet, frost, ice, fog, cloud, hot/warm, cold, storm, wind, thunder, Measuring weather: temperature,	PHYSICS <u>Seasonal changes</u> - observe changes across the 4 seasons (i.e. weather, trees/plants) - observe and describe weather associated with the seasons and how day length varies - Understand which months are in which season - Understand how certain events i.e. baby lambs being born, Christmas, Easter etc are associated with different seasons. <u>Disciplinary Knowledge:</u> measuring rainfall, measuring temperature <u>Vocabulary:</u> Seasons: spring, summer, autumn, winter, seasonal change. Weather: e.g. sun, rain, snow, sleet, frost, ice, fog, cloud, hot/warm, cold, storm, wind, thunder,	PHYSICS <u>Light</u> - recognise that they need light in order to see things and that dark is the absence of light - notice that light is reflected from surfaces - recognise that light from the sun can be dangerous and that there are ways to protect their eyes - recognise that shadows are formed when the light from a light source is blocked by an opaque object - find patterns in the way that the size of shadows change <u>Vocabulary:</u> Light and seeing: dark, absence of light, light source, illuminate, visible, shadow, translucent, energy, block. Light sources: e.g. candle, torch, fire, lantern, lightning. Reflective light: reflect, reflection, surface, ray, scatter, reverse, beam, angle, mirror, moon. Sun safety: dangerous, glare, damage, UV light, UV rating, sunglasses, direct. <u>Assessment:</u> Explain what the dark is (absence of light) Identify different sources of light including natural light and manmade light Understand what reflection is Understand how shadows are formed	PHYSICS <u>Earth and space</u> - describe the movement of the Earth and other planets relative to the sun in the solar system - describe the movement of the moon relative to the Earth - describe the sun, Earth and moon as approximately spherical bodies - use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky - name and order the planets in our solar system <u>Vocabulary:</u> Solar system: star, planet. Names of planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Uranus. Shape: spherical bodies, sphere. Movement: rotate, axis, orbit, satellite. Theories: geocentric model, heliocentric model, astronomer. Day length: sunrise, sunset, midday, time zone. <u>Assessment:</u> Name and order the planets in our solar system Explain the movement of the moon and its phases Explain night and day Describe the shape and size of the earth, sun and moon.

thermometer. Night, day, daylight.	weather forecast. Measuring weather: temperature, rainfall, wind direction, thermometer, rain gauge. Day length: night, day, daylight. <u>Assessment:</u> Explain/draw the changes that occur across the seasons Be able to match seasons to months and events Explain how to keep safe in summer	<u>Forces and magnets</u> - compare how things move on different surfaces - notice that some forces need contact between 2 objects, but magnetic forces can act at a distance - observe how magnets attract or repel each other and attract some materials and not others - compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials - describe magnets as having 2 poles - predict whether 2 magnets will attract or repel each other, depending on which poles are facing <u>Vocabulary:</u> How things move: move, movement, surface, distance, strength. Types of forces: push, pull, contact force, non-contact force, friction. Magnets: magnetic, magnetic field, magnetic force, bar magnet, horseshoe magnet, ring magnet, magnetic poles (north pole, south pole), attract, repel, compass. Magnetic and non-magnetic materials: e.g. iron, nickel, cobalt. <u>Assessment:</u> Explain what a force is Explain the difference between a push and a pull Group materials that are magnetic and not magnetic Explain that North and South magnetic poles attract and the same magnetic force will repel Explain that some magnets are stronger than others PHYSICS <u>Sound</u> - identify how sounds are made, associating some of them with something vibrating	<u>Forces</u> - explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object - identify the effects of air resistance, water resistance and friction, that act between moving surfaces - recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect <u>Vocabulary:</u> Types of forces: air resistance, water resistance, buoyancy, upthrust, Earth's gravitational pull, gravity, opposing forces, driving force. Mechanisms: levers, pulleys, gears/cogs. Measurements: weight, mass, kilograms (kg), Newtons (N), scales, speed, fast, slow. Other: streamlined, Earth. <u>Assessment:</u> Explain what gravity is and how it can affect falling objects Explain what air resistance, water resistance and friction is and the effect they have on objects Explain the effect of levers, pulleys and gears in relation to input vs output <u>Light</u> - recognise that light appears to travel in straight lines - use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye (angle of incidence and angle of reflection) - explain that we see things because light travels
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		• recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases <u>Vocabulary:</u> Parts of the ear: eardrum. Making sound: vibration, vocal cords, particles. Measuring sound: pitch, volume, amplitude, sound wave, quiet, loud, high, low, travel, distance. Other: soundproof, absorb sound. <u>Assessment:</u> Explain what sound is Explain how sound can travel to your ear Match sounds to pitch Explain how the volume of a sound can be changed Explain why sounds sound quieter the further away you are from the source <u>Electricity</u> • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and	from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them and that the size and shape can change as the light source or object moves closer or further from the light source. • Understand that eyes should be protected from strong sources of light <u>Vocabulary:</u> Reflection: periscope. Seeing light: visible spectrum, prism. How light travels: light waves, wavelength, straight line, refraction. <u>Assessment:</u> Explain using a diagram that light travels in straight lines and we can see objects as light is reflected. Name some natural and manmade light sources Explain how eyes can be protected from strong light sources Explain how shadows are formed and how shadows change as the source is moved closer and further from the light source. <u>Electricity</u> • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of
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		associate this with whether or not a lamp lights in a simple series circuit recognise some common conductors and insulators, and associate metals with being good conductors <u>Vocabulary:</u> Electricity: mains-powered, battery-powered, mains electricity, plug, appliances, devices. Circuits: circuit, simple series circuit, complete circuit, incomplete circuit. Circuit parts: bulb, cell, wire, buzzer, switch, motor, battery. Materials: electrical conductor, electrical insulator. Other: safety. <u>Assessment:</u> identify common appliances that run on electricity understand vocab of 'series circuit' and 'appliance' and 'mains electricity'. Name cells, wires, bulbs, switches and buzzers from a picture identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery Understand if a simple circuit will work from a diagram including the use of switches. recognise some common conductors and insulators	bulbs, the loudness of buzzers and the on/off position of switches use recognised symbols when representing a simple circuit in a diagram including buzzer, open and closed switch, lamp, wires, cell, voltmeter, ammeter <u>Vocabulary:</u> Flow and measure of electricity: voltage, amps, resistance, electrons, volts (V), current. Circuits: symbol, circuit diagram, component, function, filament. Variations: dimmer, brighter, louder, quieter. Types of electricity: natural electricity, human-made electricity, solar panels, power station., positive, negative <u>Assessment:</u> Identify the following symbols: buzzer, open and closed switch, lamp, wires, cell, voltmeter, ammeter Draw a simple circuit using the correct symbols Explain how the number of volts can affect the brightness of a bulb or volume of a buzzer
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Working Scientifically			
DISCIPLINARY KNOWLEDGE			
EYFS	Year 1/2	Year 3/4	Year 5/6
Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.	WORKING SCIENTIFICALLY - Asking simple questions and recognising that they can be answered in different ways - Observing closely, using simple equipment - Perform simple tests - Identifying and classifying - Using their observations and ideas to suggest answers to questions - Gathering recording data to help in answering questions	WORKING SCIENTIFICALLY - Asking relevant questions and using different types of scientific enquiry to answer them - Setting up simple practical enquiries, comparative and fair tests - Make systematic and careful observation and where appropriate take accurate readings using range of equipment i.e measuring rainfall, measuring temperature - Gather record classify and present data in a variety of ways to help in answering a question. - reporting on findings using simple scientific language, drawings, diagrams keys, bar charts and tables. - Using results to draw simple conclusions, make predictions for new values suggest improvements and raise further questions. - Identifying differences, similarities or changes related to scientific ideas and processes - Using straight forward scientific evidence to answer questions or to support their findings.	WORKING SCIENTIFICALLY - planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary - taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate - recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs - using test results to make predictions to set up further comparative and fair tests - reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations ? identifying scientific evidence that has been used to support or refute ideas or arguments.

Stanton-in-Peak Church of England Primary School
Progression in Disciplinary Knowledge
"Life in all its fullness." John 10:10

Key Stage	Classification	Observation over Time	Observing Patterns	Control of Variables Strategy (Fair Testing)	Researching using secondary sources	Knowledge of apparatus and techniques, including measurement	Knowledge of data analysis	Knowledge of how science uses evidence to develop explanations
EVFS	Names are the beginnings of classification – Pupils name plants including trees and animals. <i>dandelion, daisy, daffodil, oak tree, silver birch</i>	Pupils observe changes linked to the seasons, growth over time i.e. themselves, plants and simple animal life cycles (frog, chick or butterfly).	Pupils use their surroundings to make observations: <i>Puddles turn to ice on cold mornings, Which materials float? When do plants grow? The weather in different seasons</i>	Pupils are introduced to the concept of fairness to compare simple situations, such as which plant grows fastest?	Pupils will use picture books and images to ask and answer questions	Pupils use sand timers, sieves, measuring jugs etc as part of guided play or maths lessons. <i>Children use a thermometer as a class.</i>	Pupils will make marks which may be used for simple counts - e.g. how many bugs did you see? <i>Tally charts</i>	
KS1	Pupils use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, such as <i>man-made vs natural; mammals, birds, amphibians and reptiles; types of food groups.</i> With adult support and guidance pupils begin to make conclusions, use scientific terminology and ask effective questions.	Pupils make and record observations over time. For example: <i>plant growth, life cycle of a butterfly and seasonal changes</i> using scientific vocabulary with support. Pupils may use simple equipment such as <i>rulers, magnifying glasses and simple timers.</i> With adult support and guidance pupils come to conclusions, begin to use scientific terminology and ask effective questions.	Pupils make and record patterns including: •Where can you find woodlice? •Which materials float? •How does the phase of the Moon change over the course of several days? With adult support and guidance pupils observe useful patterns, begin to use scientific terminology and ask effective questions.	Fair testing, is modeled and discussed as a class and group decisions are made. With support, pupils observe useful patterns, begin to use scientific terminology and ask effective questions about the variables and the results. •Which materials float?	Pupils should ask people questions and use simple secondary sources, such as books, photographs, or websites, to find answers.	Measurement: length and time, Pupils measure time using a simple stop clock. Pupils also learn to measure volume (rain collecting), weight and temperature accurately. <i>e.g. measuring rainfall, measuring temperature</i> Technique: using a sieve to separate mixtures;	With support, pupils gather, record data and with analyse data. They use pictograms and tallies. Pupils will need support to choose appropriate ways of recording data. <i>e.g. measuring rainfall & temperature, making tally charts.</i>	Pupils should begin to use their observations and ideas to suggest answers to questions. <i>e.g. wrapping ice cubes in different materials to see which one melts quicker.</i>
LKS2	Pupils develop their knowledge of common categorisation in science, <i>for example vertebrates and invertebrates; conductors and insulators.</i> They should practice using this knowledge themselves, beginning with simple examples and moving on to examples which are more difficult to categorise, such as <i>whales as mammals, toothpaste as liquid/solid etc.</i>	With guidance, pupils will make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers <i>Using a sound level meter to take readings around school.</i>	With support, pupils make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers- with this data pupils identify patterns with support. <i>Using a sound level meter to take readings around school.</i>	By the end of year 4, pupils are expected to set up simple fair tests. In LKS2 this process is carefully scaffolded and modeled to the children. <i>Using a sound level meter to take readings around school. Use a table to record how to change the pitch and volume of different musical instruments, making a graph of how friction affects the distance a toy car travels or creating a diagram of the water cycle.</i>	Pupils should begin to recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.	Pupils begin to make their own decisions about the most appropriate type of equipment to use for taking measurements. They should be taught how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. <i>Using a sound level meter to take readings around school. Use a table to record how to change the pitch and volume of different musical instruments, making a graph of how friction affects the distance a toy car travels or creating a diagram of the water cycle.</i>	With careful guidance, pupils look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. <i>e.g. Observing how your pupils respond to changing light, observing how shadows change as a light source moves</i> With support, they identify new questions arising from the data, making predictions for new values within or beyond the data they have collected, and finding ways of improving what they have already done.	Pupils should use results to draw simple conclusions, make predictions, suggest improvements and raise further questions. Pupils begin to gain an understanding that science doesn't know all of the answers: it is constantly developing and correcting ideas that evidence subsequently shows is incorrect, or only partially correct.
UKS2	Pupils continue to develop their knowledge of common categorisation in science, for example reversible and irreversible changes. <i>Investigating whether salt evaporates with water</i> They use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.	Pupils make systematic and careful observations and take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers <i>Use pulsemeter to measure resting heart rate then compare it to heart rate after exercise</i>	Pupils make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers- using the data and their substantive knowledge pupils identify patterns. <i>Use pulsemeter to measure resting heart rate then compare it to heart rate after exercise</i>	With support, pupils recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. <i>e.g. Using initial findings in separating materials investigation to inform further investigation questions.</i>	Pupils will recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.	Pupils take measurements independently, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. They will use thermometers, stop clocks, measuring jugs and data loggers with precision. They will recognise anomalies in results and repeat readings. <i>e.g. Investigating light travelling in straight lines by accurately directing a torch beam to a specific point, adapting investigation to looking at light travelling around objects.</i> Pupils in years 5 and 6 use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions.	Pupils record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. <i>e.g. Use pulsemeter to measure resting heart rate then compare it to heart rate after exercise, recording results in a line graph and finding the mean heart rate.</i> Pupils decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed;	With guidance, pupils identify scientific evidence that has been used to support or refute ideas or arguments. This may be using historical examples of key discoveries such as the <i>heliocentric model of the Solar System</i> , Darwin's finches and germ theory. <i>e.g. Investigating whether salt evaporates with water or investigating separating materials such as ball bearings in sand.</i> In their own experimental work, pupils will use their results to make predictions to set up further comparative and fair tests with support. <i>e.g. Using initial findings in separating materials investigation to inform further investigation questions</i>